

Magnet Issues for Acceleration

J. Scott Berg

Brookhaven National Laboratory

MAP 2014 Spring Meeting

30 May 2014

- Achieving high fields
 - Big advantage: higher energies on Fermilab site
 - Better RF efficiency/fewer decays
 - Pulsed (hybrid) synchrotrons: high fields for both pulsed and SC magnets
- Radiation shielding of SC magnets
 - Head load
 - Magnet survival
- Pulsed magnets
 - High fields
 - Short pulse times
- Shielding SC cavities from magnets in linac

- Not really in the IBS work plan at this point, but worthy of thought (or at least mention)
- Iron response (B vs. H) for our parameters and beyond
 - High pulse rates, high fields, thin laminates
 - Getting a bit more field out of the iron
- Designing a power supply to give a reproducible, controlled ramp at these rates and powers
- Is shielding a Fe-Co pole out of the question?
 - May not be completely crazy since source is leptons
- Having a look at a pulsed quadrupole (and later a sextupole) design

- Pulsed dipole designs and experimental work
- Present two design ideas for pulsed dipoles
- Understand reasons for design choices that are made
 - Why the design choices are beneficial
 - Explaining the underlying physics, material properties, etc. where appropriate
- Hear about recent pulsed dipoles experimental work
- Subsequent discussion so help all parties understand the designs
- Come up with some next steps, within funding/manpower constraints

- Working set of parameters for discussion
 - Probably the most challenging parameters
 - IBS design numbers will differ from these, but not drastically
- Bipolar, linear ramp from -1.5 T to $+1.5$ T in 0.5 ms
- Horizontal good field region 6 cm
- Vertically 2.5 cm between poles
- 2200 m of dipoles in the ≈ 375 GeV to 750 GeV ring